

Summary on Proposed Aquatic Life Criteria for Chloride

I. Current EPA Criteria

The national criterion for chloride was published in 1988 and was derived based on the toxicity test data of sodium chloride in laboratory reconstituted water since it was the only chloride composition with enough data available to allow derivation of a water quality criterion. Also, it seems likely that most anthropogenic chloride in ambient water is associated with sodium, rather than potassium, calcium, or magnesium. In the EPA 304(a) criteria document, the acute toxicity data for chloride are available for 12 different species (genus).

Chronic toxicity data and their acute chronic ratios were available for three species, *daphnia pulex*, rainbow trout and fathead minnow. Thus, the chronic criteria were derived based on final acute value and the geometric mean of the acute chronic ratios for the above three species. The following national criteria for Chloride are recommended by the EPA.

Table 1. National Aquatic Life Criteria for Chloride - 1988

| Parameter | National Criteria (mg/l) | |
|-----------|--------------------------|---------|
| | Acute | Chronic |
| Chloride | 860 | 230 |

II. IDNR Recalculated Criteria

New toxicity data have become available since the EPA national criteria were published in 1988. Thus, IDNR staff conducted a new toxicity data search. New acute toxicity data for two additional species, *Ceriodaphnia dubia* and *Mosquitofish* were found that were not in the 1988 national criteria database. Additional acute toxicity data were also found for the two species that were included in the 1988 national criteria database, *daphnia magna*, and *fathead minnow*. Using both the new toxicity data and the EPA 1988 toxicity data, the following criteria were derived based on the 1985 EPA guideline procedure (EPA, 1985).

Table 2. IDNR Recalculated Aquatic Life Criteria for Chloride – June 2007

| Parameter | Class B Warm water (mg/l) | | Class B Coldwater (mg/l) | |
|-----------|---------------------------|---------|--------------------------|---------|
| | Acute | Chronic | Acute | Chronic |
| Chloride | 638 | 372 | 638 | 320 |

III. EPA Office of Research and Development (ORD) Recalculated Criteria

IDNR sent the chloride issue paper (June 2007) to EPA Office and Research Development in Duluth, MN for review. Chuck Stephan in ORD spent concerted effort to search other toxicity data available in addition to the ones found by IDNR. As a result,

additional toxicity data were found and the national chloride toxicity database has increased from 12 to 34 genus species. The four most sensitive species are *Daphnia spp.* (*Daphnia magna* and *Daphnia pulex*), Snail (*Gyraulus circumstriatus*), *Ceriodaphnia dubia*, and *Fingernail clam* (*Sphaerium tenue*). The recalculated criteria are shown in Table 3. These recalculated results have been reviewed by ORD staff and the EPA HQ staff in the Health and Ecological Criteria Division (HECD) as well as IDNR staff.

Table 3. EPA ORD Recalculated Aquatic Life Criteria for Chloride – Nov. 2007

| Parameter | Option #1 (mg/l) | | Option #2 (mg/l) | |
|-----------|-----------------------|-------------------------|-----------------------|-------------------------|
| | Acute | Chronic | Acute | Chronic |
| Chloride* | 546 (round to 550) | 425.2 (round to 425) | 546 (round to 550) | 382.3 (round to 382) |

* Apply to both warm water and coldwater designations

Two different chronic criteria are recalculated based on two different approaches. Option #1 uses the acute chronic ratio method as outlined in the 1985 guidance. Option #2 uses a modified approach from the 1985 guidance, which is justifiable based on the observation that the species acute chronic ratio seems to increase as the species mean acute values. That is, vertebrates have a higher acute chronic ratio, on the average, than invertebrates for chloride. The approach for option #2 takes into account the chronic sensitivities of both vertebrates and invertebrates to chloride.

REFERENCE:

U.S. EPA. 1985. Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses. PB85-227049. Washington, D.C.